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Journal of the Society of Arts.

FRIDAY, MARCH 6, 1868.

Announcements by the Council.

ARTISANS' REPORTS ON THE PARIS EXHIBITION.

The Reports of the Artisans selected by the Council to visit the Paris Exhibition are now ready, and may be had of the Society's publishers, Messrs. Bell and Daldy, York-street, Covent-garden. One volume; demy 8vo., 732 pages, price 2s. 6d. in boards, or 3s. 6d. in cloth. The volume contains reports, by upwards of eighty artisans, upon the principal industries represented in the Exhibition, as well as special reports on the condition and habits of the French working classes.

ORDINARY MEETINGS.

Wednesday evenings, at Eight o'clock:—

MARCH 11.—“On Courts of Arbitration, and the Principles of Co-operation, as means of bringing into Harmonious Action the Interests of Capital and Labour.” By THOMAS BEGGS, Esq. On this evening WM. FARR, Esq., M.D., F.R.S., will preside.

MARCH 18.—“On Railways and their Management.” By ROBERT F. FAIRLIE, Esq.

MARCH 25.—“On Horse as an Article of Food.” By A. S. BICKNELL, Esq. On this evening Sir JOHN LUBBOCK, Bart., F.R.S., will preside.

CANTOR LECTURES.

The following is the syllabus of a course of four lectures “On Chloride of Sodium, or Common Salt, the Products obtained from it, and their Applications to Arts and Manufactures,” to be delivered by Dr. F. CRACE CALVERT, F.R.S., as follows:—

LECTURE I.—FRIDAY, MARCH 13.

CHLORIDE OF SODIUM, OR COMMON SALT.—Its extraction and composition. *Sodium*—Its manufacture and employment in the production of aluminium, magnesium, and gold. *Chlorine*—Its preparation and properties, and especially its action on certain metals. Illustrations.

LECTURE II.—FRIDAY, MARCH 20.

THE BLEACHING PROPERTIES OF CHLORINE.—*Bleaching Powder*, its manufacture and application to the bleaching of calico, linen, and paper pulp; the manufacture of chloroform, &c. Illustrations.

LECTURE III.—FRIDAY, MARCH 27.

CHLORINE AND ITS COMPOUNDS WITH OXYGEN.—*Chlorate of Potash*—Its manufacture and remarkable properties. *Hydrochloric acid*, or spirit of salt—Its production and applications in Arts and Manufactures, viz., galvanizing of iron, sal ammoniac, chloride of tin, &c. Illustrations.

LECTURE IV.—FRIDAY, APRIL 3.

THE CONVERSION OF CHLORIDE OF SODIUM INTO CARBONATE OF SODA.—The decomposition of common salt into hydrochloric acid and *sulphate of soda*, Glauber's

salt; the transformation of this compound into *soda ash*, *soda crystals*, and *bicarbonate of soda*, Ballard's process; and the important and recent discovery of the utilisation of soda waste, &c. Illustrations.

The lectures commence each evening at Eight o'clock, and are open to members, each of whom has the privilege of introducing two friends to each lecture. Tickets for this purpose are forwarded to each member with this number of the *Journal*.

SUBSCRIPTIONS.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed “Courtts and Co.,” and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

FOOD COMMITTEE.

The Committee met on Saturday, February 15th. Present—Mr. Harry Chester (in the chair), Mr. Samuel Gurney, M.P., Mr. E. C. Tufnell, and Mr. G. F. Wilson, F.R.S.

Mr. FRANK WHITAKER, architect, of Westminster-chambers, attended to give information with respect to a projected meat and general market at the West-end of London, and, in reply to the interrogations of the Committee, stated that he had given attention to the subject of the food markets of London. He had more especially considered it with reference to the affording of facilities for bringing meat, vegetables, poultry, &c., to London, to a site where such a concentration of the ordinary railway system of the kingdom existed as would give the most favourable means for the distribution of provisions around London, as well as meet the wants of a very large and populous district of the metropolis in the immediate vicinity of the proposed market, whereby the expenses of re-carriage would be diminished, and trouble saved to the dealers in the various kinds of provisions. At the present time the butchers of Richmond had to get up at two o'clock in the morning in order to be at the meat markets by four. If the meat markets were placed in contiguity with the railways a great deal of that inconvenience, he thought, might be obviated. The railways would then have the power of receiving the goods into the market and reshipping them round London, by which, he imagined, a considerable amount of expense, which the public had to pay for now in the price of the provisions, would be saved. In other words, if the articles could be brought into the market cheaply they could be sold cheaply. It was considered that great advantage would be derived from having a general provision market established in connection with the inner circle of railways round London, in regard to facilities of distribution to the suburbs, as well as affording great accommodation to the inhabitants of the west and south-west districts of London in the purchase of provisions.

The CHAIRMAN inquired whether Mr. Whitaker was acquainted with the existing markets of London?

Mr. WHITAKER replied he was, and also with some of the larger provincial markets, and he had seen the market in Birmingham. The proposed market, being on the banks of the river, would afford great facilities for the fish trade; but the great bulk of fish now brought to London was carried by the railways. The business in fish carried by the various railways was very large indeed.

He had been favoured by Mr. Forbes with the returns of the Chatham and Dover Railway, which showed that they carried as much as 1,700 tons of fish per annum for the London market, delivered at the stations at Blackfriars and Victoria. His plan had not yet been launched, but would be so very shortly, as a limited liability company; and from the managers of the railways most interested in it, viz., the London and Brighton and the Chatham and Dover, he had received letters stating they would give every possible encouragement to the undertaking, although they would not assist in a financial point of view.

A conversation ensued with respect to the evidence already before the Committee as to the mode of conducting the fish trade in the purchase of the fish at the outposts, by agents located there for the purpose, and its consignment to the Billingsgate salesmen. The recent evidence of Mr. Charles on this subject was referred to, also that with regard to the failure of Hungerford market, and Mr. Whitaker stated that he thought one element of success with regard to the fish trade in the projected market was to be found in the fact that the fish would be brought direct into the market by the railways, by which the serious delays in the delivery, which were spoken of by Mr. Charles, would be obviated.

Mr. WHITAKER then proceeded to lay before the Committee the details of his plan. The proposed site of the market, he said, was in the Victoria-road, adjoining the York-road Station of the Chatham and Dover Railway, and about a quarter of a mile from the Victoria Station. This site at Battersea was within very easy reach of the whole of the West-end and south of London, and communicated with the Brighton and South-coast, the South-Western, Great Western, and West London, the Chatham and Dover, the South-Eastern, and Metropolitan Railways. The land, which comprised an area of $5\frac{1}{2}$ acres, was already in the possession of the promoters, but in the financial difficulties of the country the scheme had been allowed to lie dormant; but, under the promised countenance of the railway companies, there was every prospect of its being speedily carried out. The market would be reached on the rail level of the Brighton line at Battersea, and the goods could be brought from all parts of England direct into this dépôt whence they could be reshipped all round London; and the dealers and purchasers could come up at all times, buy their goods, and go back with them. There would be a wharf by the side of the Thames for the landing of goods brought by water carriage; and it was thought to be an advantage with respect to the foreign cattle-trade that the animals should be brought up to this market in barges constructed for the purpose, and slaughtered, some of the arches of the railway viaduct being utilised for abattoirs, and others for vegetable stores, &c. He had no doubt the railway companies would establish market trains. Within a circuit of one mile round this site there was at present a population of 250,000, and building was now going on to such an extent that what were fields one day were, in the next three months, covered with houses. This vicinity was largely inhabited by the artisan classes, to whom such a market could not but be a very great accommodation and benefit, because in this district there were scarcely any shops, and those of an inferior kind. On Saturday nights the Wandsworth-road was a perfect fair, from people coming from all the district round to purchase their provisions, when, for about a penny fare by the railway, they could go to this market and purchase their goods to greater advantage.—[Mr. Whitaker laid before the Committee a plan of the proposed market site, and pointed out the principal features of the surrounding locality. He also produced a drawing of the elevation of the projected building.]—The capital, he said, would be £120,000, to be raised in £60,000 shares of £2; and, as the company would be incorporated under the Joint-Stock Companies' Act of 1862 and 1867, no application to Parliament would be necessary to carry out the undertaking.

Mr. TUFNELL remarked that the existing toll on Chelsea-bridge would be a great objection in reference to this scheme. The toll was only removed on Sundays and Good Fridays.

Mr. WHITAKER said he was not aware of the value of the tolls of that bridge, but being in the hands of the government, he did not think that would be allowed to stand in the way of so great a public benefit to that district of London. They had the densely-populated neighbourhood of Vauxhall on one side of the river, and the wealthy neighbourhood of Belgravia on the other; and people might come from Clapham to this market for 2d. He considered such a market would be of advantage to the inhabitants of the West-end. If they had a good market in their own vicinity, they would not go to the City markets for their articles. His idea in this scheme was that of combining Covent-garden, Billingsgate, and Newgate, in regard to the provisions brought there, and thence distributed to that part of London and its suburbs—meat, poultry, fish, vegetables, milk, &c. He had had no communication with the great meat and fish dealers of London on this subject, and it was probable they might oppose any innovation of this kind; but he thought all these things would work themselves round in time. The railways, he thought, would exercise great control in the matter. They would say, "We bring you the things, and you must fetch them away." According to the evidence of Mr. Charles, fish was sometimes kept at the railways till 2 or 3 o'clock in the afternoon. In this case they had only to buy the goods and take them away.

The CHAIRMAN remarked that a great deal of fish was brought up to London at three or four o'clock in the afternoon. Of course, a market in connection with the railways would facilitate the distribution of that fish. He inquired at what cost Mr. Whitaker expected to purchase the site of $5\frac{1}{2}$ acres he had spoken of?

Mr. WHITAKER believed the land could be obtained at £3,000 per acre, which was about the price the Brighton Company paid for it. At the smallest calculation, he believed the return upon the capital would be from seven to eight per cent. A great portion of the income would be derived from the rents of the shops and stalls, which he averaged at about £20 a year each, and, as the Market Company would be the salesman of the produce, a large commission for agency would also be available. There was a large amount of market gardening carried on in the district, and the railway arches would afford large storage room for vegetable produce brought to the market. With regard to the supply of meat, that article could be brought from all parts of England direct to the spot. Live cattle could be brought to the market in barges, direct from the vessels in which they were brought from abroad. He was aware that there was a proposition before Parliament to have a separate market for foreign cattle. That was proposed to be near Millwall Docks, and was proposed with a view of slaughtering the animals on the spot where they were landed. He thought, if the animals were brought to this market in barges, there was nothing to fear from contagion, because they would be killed, and there was an end of them. He could not imagine a site more eligible for a market in all respects. There was a splendid supply of water, and first-rate drainage, as the main drainage ran through the site. They had gas to any amount, and they had a large population all round. The project would shortly be brought out as a limited liability company, and would not require an Act of Parliament. It would be to the interest of the railway companies to promote the scheme as far as possible. On the subject of the alleged injury to live cattle by re-shipment, he stated that flat-bottomed sea-going vessels might be constructed to bring cattle from distances like Dieppe, which, by being fitted with lowering masts, could pass through the bridges, and the cattle could be brought up to the company's own wharf without re-shipment or being driven through London.

Mr. WHITAKER remarked that the establishment of such

a market would be a matter of great public importance and benefit with regard to the population of one side of the river only.

The CHAIRMAN observed that another project, which had been laid before the Committee for a market in the vicinity of Paddington, was considered to be open to the objection, that, as it was not proposed to be in immediate connection with the railway it would involve as much re-shipment of the goods as if it were miles away from any railway. There could be no question as to the advantages of this proposed site in regard to the great facilities of railway communication which it would afford.

Mr. WHITAKER handed to the Chairman the report of meat, fish, &c., carried by the London, Brighton, and South Coast, and the London, Chatham, and Dover Railways, for which he said he was indebted to the managers of the two railways, Mr. Hawkins and Mr. Forbes.

STATEMENT OF CATTLE, FISH, MEAT, &c., BROUGHT INTO LONDON DURING THE YEARS 1866 AND 1867 :—

London, Brighton, and South Coast Railway.

	1866.		1867.
Cattle	167	...	238
Calves	81	...	322
Sheep	9,141	...	8,745
Pigs	163	...	47
Milk	409,912 gals.	...	409,734 gals.
Fish	3,569 tons	...	3,287 tons
Eggs	5,635 "	...	4,187 "

London, Chatham, and Dover Railway.

Meat	238 tons	Beasts	37
Fish	1,768 "	Sheep	6,964
Fruit & Vegetables	12,055 "	Pigs	16

The Committee thanked Mr. Whitaker for the information he had given them.

Mr. ROBERT WALKER then gave evidence in reference to a market scheme as follows:—He stated that he was a member of the Society of Arts, and by profession an architect. He had given attention to the subject of markets in London from having read the proceedings of the Committee from time to time, and having been connected with various projects for markets. He was at present connected with a project under the title of the Suburban Market Company, the object of which was to erect about eight market places as an experiment in different most populous suburbs of London. That company was at present advertising for information with respect to sites adapted for the purposes in view. Two sites were already in contemplation in the South of London, viz., at Walworth and at Brixton. The object was to start these markets, and to build market-places on a small scale, at a cost of about £3,000 each, keeping in view the desirability of having them situated as near as possible to good local railway termini. The plan was, to let the stalls in the markets to the highest bidders. It was calculated they would bring from £30 to £35 a-year each—shops or stalls with counting-houses; and, the company paying the rates, and gas, and water, this would leave a net rent of about £20 a-year each. The company would have no more to do with the market than as lessors of the shops or stalls; it would be purely a building speculation on the part of the company. It was proposed that these markets should, where practicable, be in connection with the railways, so that the supplies might come to them direct from the great centres of London, or from the country. The main support which the company looked for was in respect of the meat trade. There were large farmers in different parts of the country who sent up dead meat to London. It was anticipated that many of them would take a stall in each of these markets, or make an election of one or more markets to which they could send their meat direct, and save the expense of the salesmen. This project was suggested to those who had taken the initiative in it by a leading article which appeared in the *Times* last October,

which stated as follows:—"We think we can see one defect which ought to be at once remedied. The trade is not quite open enough, for lack of sufficient centres of supply. We ought, in fact, to have many more markets. It ought not to be necessary to traverse the City in order to make use of such a remedy. In French towns markets are multiplied, and are within the reach of every one, and a similar advantage ought to be afforded us in London." On the strength of that article this company was projected; the shares were £5, and the proposed capital £20,000 or £25,000. If shares to the amount of half the cost of one of these market buildings were taken in any locality, then the company proposed to build a market. This kind of support had been promised by persons in Brixton. Of course he anticipated opposition to this project; and in some cases the support which was promised had been withdrawn.

The CHAIRMAN inquired whether the company in question had at all entertained the idea of taking any of the existing local markets and working them; for instance, Farringdon, which had failed, and Oxford-market, which was only a partial success. Had any attempt been made by the company to utilise the markets which exist?

Mr. WALKER replied that he had looked at both the markets with that view. Farringdon was too large an affair for the company to touch. He thought both those markets were in the wrong place; his own opinion was, that every market should be in the main line of thoroughfare. Unless they were on the principle of the doors being open to the public, they were failures, and a market to be successful should be near to a railway terminus. One or two of the railway companies which had disposed of surplus land near stations, had been the means of making small markets; and exorbitant rents had been asked for small pieces of land which they let. It was proposed to have from 30 to 40 stalls in each of these market buildings. The principal thing the company looked to was for people in the provinces to take stalls and send their produce consigned direct to the market. He thought with regard to fish there might be some difficulty; but it was believed that farmers and graziers who killed their meat in the country would send it direct to this market. Fish, no doubt, would have to be brought from the large central market, as was done now, but the public would be able to buy fish cheaper at a market of this kind than they could at the fishmongers' shops.

The CHAIRMAN inquired whether the company had had any communication with the Royal Agricultural Society, as, he said, it was desirable to have their co-operation in any useful improvement of the market system.

Mr. WALKER replied that he had not yet communicated with that society, but he should be glad of the opportunity of doing so. He believed this plan would come before the public in a definite form in the course of a few weeks. The principal difficulty hitherto had been to get appropriate sites.

Mr. TUFNELL inquired whether any site was contemplated in the neighbourhood of Paddington.

Mr. WALKER replied in the negative. The intention, he said, at first was to purchase the land, but as they ascertained that freehold land as a rule would not pay more than three or four per cent., and as that was a small profit for a speculation of this kind, the company determined, if they were unable to buy freehold land on advantageous terms, to purchase leaseholds; people expected to make five or six per cent. in a concern of this kind. These markets would not be placed in very poor neighbourhoods; they were intended to benefit and accommodate the lower portion of the middle class, not the upper portion. There was undoubtedly an advantage in having a mixed trade among butchers where the better portions of the meat would be bought by those who could afford to do so, and the inferior parts by the poorer classes. In very poor neighbourhoods, the costermongers made the best markets for the lower classes. The middle classes often took long credit from

their butchers, and paid a higher price for their meat in consequence, but the artisan class were always ready-money customers, and would therefore buy upon the best terms if they had the opportunity of going to a good market. There was another point to be considered. A tradesman, on going into a locality, was compelled to take a lease of the premises he wished to occupy. The responsibilities of a lease, &c., were sometimes more than a small tradesman could manage, and there were circumstances which prevented that open competition amongst tradesmen which there was in a public market. A man taking a stall in one of these markets at 12s. or 15s. a week, had no further responsibilities; and if he had £30 or £40 capital to buy his goods from the central market, he would be content with smaller profits than a man with a lease and all the other responsibilities and expenses attaching to a tradesman. The markets proposed would be of the most open kind. He repeated his belief that a great number of farmers who grazed cattle would send their dead meat to these markets, the great inducement to do so being in the fact that they would make a larger profit on their produce than by sending it to Newgate Market, which involved the commission to the salesman. This plan did not imply that the farmers must, to a certain extent, become butchers. It was anticipated that these markets would have the support of the inhabitants of the localities in which they were established, in the way of subscriptions to the capital, by which a pecuniary interest in the success of the undertaking would be created. The business of these markets would be conducted under the regulations of the company, and they would be open to the usual public inspection with regard to the articles sold, and the suppression of fraudulent practices on the part of the dealers.

Mr. TUFNELL remarked upon the desirability, in the interests of the public, of articles being brought into the market and disposed of without the intervention of the professional salesmen, who, to a great extent, held the producers in their power with regard to the amount of profit they made upon their articles. He mentioned the fact that a large grower of early potatoes in the Scilly Islands had given up that cultivation on account of its not being remunerative, although the produce was sent over here at a time when potatoes fetched as much as 2s. 6d. per lb. in Covent-garden; but the great bulk of the profit was taken by the intermediate salesman, which ought to have gone to the producer.

Mr. WALKER observed that there was a certain amount of prejudice against attending markets on the part of the middle classes, which markets of this description would be likely to overcome. In this respect we differed very much from the same classes on the Continent, inasmuch as persons of the highest respectability made it a practice to attend the market themselves to purchase the articles they required. The trade in London was, to a large extent, carried on under the system of sending orders to the tradesmen by people who went round every morning for that purpose; they seldom or never saw the articles till they were delivered at the houses. By obtaining local subscriptions to the capital, as was proposed, people would have a direct interest in supporting these markets.

The CHAIRMAN remarked that, in the question of the supply of food, there was a great want of local organisation. In the neighbourhood in which he resided as many as 30 or 40 different butchers' carts came into the street for orders. In the co-operative societies which had been established the members lived in all parts of London; but if that system was to answer—which he doubted, as a permanency—he thought the co-operation should be local. If they could get 50 or 100 families in a locality to combine, and say "We will put up our custom to the best bidder, and will deal with those who supply us best for ready money," there might be an advantage in that to all parties.

Mr. WALKER said in one locality in which it was proposed to establish one of these markets, there were a

dozen or fourteen large boarding and day-schools, the proprietors of which had promised to subscribe for shares. If these promises were realised, the company would build a market-place in that locality, and the parties alluded to would have a direct interest in supporting their own premises, and earning a profit on their own investment. If the plans were realised, the profits of the undertaking would exceed 10 per cent.

The Committee, having thanked Mr. Walker for his communication, then adjourned.

THIRTEENTH ORDINARY MEETING.

Wednesday, March 4th, 1868; WILLIAM HAWES, Esq., F.G.S., Chairman of Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Briggs, Thomas, Richmond, S.W.
Winsor, William Henry Benyon, 29, Kensington-gardens-square, W., and 38, Rathbone-place, W.

The following candidates were balloted for, and duly elected members of the Society:—

Johnson, Matthew Hawkins, 379, Euston-road, N.W.
Roe, Thomas, jun., Mayor of Derby.
Sarll, John, Drapers'-hall, Throgmorton-street, E.C.
Wise, William Lloyd, Chandos-chambers, Buckingham-street, Adelphi, W.C.

The CHAIRMAN, before calling upon Mr. Randall to read his paper, announced that the main object of the evening was to hear the opinions of artisans on the question of technical education and scientific training, rather than of the members of the Society and others who might be present. He especially hoped that any of those workmen who had been to Paris would express their opinions on this subject.

The Paper read was—

ON TECHNICAL EDUCATION.

By MR. JOHN RANDALL, F.G.S., ONE OF THE ARTISAN-REPORTERS ON THE PARIS EXHIBITION.

Technical education has suddenly assumed amongst us an importance it never had before. An almost universal interest appears to have sprung up through the country in its favour—an interest which we may reasonably hope will not very soon subside.

The Society of Arts has done more than any other body of men to give to the question its present prominence, and it now seeks to ascertain how it is looked upon from a "workman's point of view."

It is as a workman, actively engaged in one of the important industries of the country, that I wish to speak. I purpose speaking, however, chiefly for myself, seeing that, in taking different stand-points, and in looking at the question on all sides, a diversity of opinion may exist. It would indeed be strange if it were otherwise. But with respect to its main features there is little doubt but that we shall be agreed. We shall agree, I think, upon its urgency and paramount importance; also, that we are greatly to blame for having permitted the question to remain so long in abeyance. Not that we, the workmen of this country, have been altogether indifferent: we might have been had we been ignorant of the productions of any other nation but our own; but with a full knowledge of the merits of those of other countries, and of the advantages brothers of the craft elsewhere enjoyed, it was impossible that we could have been so. We might indeed be said to have been in the position of the blind, but with the tantalizing knowledge that we were competing with others who could see; and as the blessings

of vision are supposed to be most prized by those deprived of sight, so no one could have regretted our infirmities more than ourselves. If I might be permitted to interpret the experience of very many others by my own, I might say our whole lives have been little more than struggles to overcome the deficiencies of education; or, to use a figure, that we were weighted in a race which needed the utmost strength we could command, that we were sent defenceless to measure our prowess with others fully equipped—and that in a struggle in which the weakest must inevitably go down. And we could scarcely fail to feel that this was neither fair, nor wise, nor economical on the part of this great nation, which suffered in its most vital parts in consequence. We felt that this false economy was telling on every one of our great industries—particularly on those coming under the head of mining and manufacturing, and that great waste of energy, life, and property resulted therefrom.

If we were an exclusive people, dependent entirely upon our own productions, and dealing only amongst ourselves, it would even then become us to husband our resources, and to make the most of those natural treasures placed at our disposal: it would behove us to turn them to the best account, to shape and to adorn them in such a way as to make them ministers of thought, carrying pleasing impressions wherever they circulate. I say, gentlemen, if we manufactured for ourselves, and our countrymen had resolved to deal exclusively with their own people, it would be inexcessably wicked not to make the most and best of our ores, our coals, our clays, and all other elements of our wealth. But when we were among the first to court a free interchange of industries, the first to consent to meet our neighbours in the open market of the world, and to submit our productions to the tribunal of nations, our credit and character were at stake, and it became the solemn duty of the people of this country to adopt means for securing some sort of fitness between the producer and his productions.

In all ordinary undertakings it is usual, when certain work is required to be done by machinery, to take pains so to prepare the machine that it may accomplish its task in the best way and in the shortest space of time; and whether it is to furrow the land, or plough the sea, care is taken that there shall be no undue friction or waste of power, whilst every improvement for saving fuel or force is eagerly sought out and adopted. If this is sound policy with regard to machines, how much more so is it with regard to men? and how much more important is it that the force which creates machines should not run to waste, but be husbanded, quickened, and turned to the best possible account?

The only way in which this fitness or adaptability can be secured is by technical training, a process the importance of which, under another form, our ancestors—wise in their day and generation—were not slow to recognise. In cases where great strain had to be put upon their mental powers, or where great skill was needed, they provided the best aids and qualifications they could, by instituting suitable preparatory training. They provided, even for adult education, institutions such as universities, and schools with scholarships, as intermediate stages between these and those primary establishments in which boys may be supposed to have mastered—even under unfavourable circumstances—the substantial elements of a useful education. And we also, following their example, still adopt the same course in preparing the youth of this country for the church, the bar, and the medical profession. Scarcely less imperative is the demand in this age and at this time of day for some such preparatory training to meet the strain put upon the mental powers of the higher class of artisans in this country by the discoveries and improvements which have taken place within the past 16 years. As the languages of the great nations of antiquity are supposed to afford to youths making choice of the three professions alluded to the key by which they may open the whole arcana of knowledge essential for the prosecution of their pursuits,

so is special instruction in what has already been achieved in art, and in the means and routine by which it has been wrought, needed to put the artisan upon a level with his peers—to enable him to press into his service the aids art or science places at his disposal.

The Exhibition of 1851 opened up a new era in manufacturing industry which, looking at the distinguished influence exercised by its author—the late lamented Prince Consort—might well be termed the Albert Epoch. This and subsequent exhibitions exploded a host of old prejudices; it gave rise to fresh activities, created new styles, and exerted an influence which reached every artisan, and taught all thoughtful men that for the future greater knowledge, higher skill, and a more intellectual training would be necessary for the successful prosecution of every one of the industrial arts.

The Exhibition of 1862 showed the extent to which the world had profited by the first; and there is no question whatever but that the advance made by this country was more observable than in the case of any other; indeed, so signal was this progress that the French were alarmed by the rapid strides we had made. One of their jurors says:—"The upward movement is visible, above all, among the English. The whole world has been struck with the progress which they have made since the last exhibition, in design." Another added,—"It is our duty to remind our workmen that defeat is possible, and that it may be even foreseen at no distant date. English industry has, during the last ten years, made amazing progress, and we may soon be left behind." A third says, on the same subject,—"It is impossible to ignore the fact that a serious struggle awaits France from this quarter." Evidently they had taken the alarm; and the way in which they prepared for the struggle is shown by their report on the Exhibition of 1867. In classes 89 and 90, under the head of "Apparatus and Methods used in the Instruction of Children," they say:—"Before entering into details concerning the articles exhibited, we cannot help stating that the space allotted for the two classes 89 and 90 has been quite insufficient to present their whole development, or to give an adequate idea of the details and *ensemble* of our vast system of public instruction. However, we feel convinced that, incomplete as this Exhibition is, it will prove to our own countrymen and to foreigners that public instruction has made in the last few years immense progress in France, thanks to a liberal and prolific impulse; and that our public and private establishments are worthy of a nation so enlightened and advanced as France proves herself in all the branches of human activity. For the first time, at the International Exhibition of London in 1862, a particular class was created to receive the school requisites, works and materials, but this was limited to infant schools and special schools for drawing. The French Exhibition of 1867, however, embraces, on a much more comprehensive scale, all kinds of education,—that of adults as well as of children, their professional education as well as technical education; and, acting up to its universal character, presents for examination the various evidences of the intellectual activity of the country. Therefore, whereas the Exhibition of 1862 numbered only 180 exhibitors in this class, that of Paris possesses as many as 500 exhibitors, which, however, is less than half the number who applied to the Imperial Commission for admission. A rapid progress has been realised during the last five years, and a still more marked advance is in process of realisation, to bear fruit in no very distant future."

This progress was witnessed by a large number of our countrymen, including a goodly sprinkling of artisans, who expressed their surprise—a surprise, however, which subsided on looking into the facilities foreign workmen enjoy for obtaining a knowledge of the principles of their art, and of the theory of their several crafts. Many of those who have written on the subject tell us that they found light and easy styles of ornamentation, founded upon a close observance of nature, and adapted

to various materials in almost endless devices; and this not altogether as applied to rich and costly articles coming within reach of the luxurious classes, but in connection with multifarious objects of elegance, produced at little cost, and intended for common consumption and general use.

They saw French workmen working less hard than ourselves, but producing higher effects with greater ease,—working with less energy, but with a greater familiarity with the science and tendencies of their art; they found these workmen acting out their parts under the direction of intelligent foremen and chiefs—themselves the higher creations of the same excellent system of technical training; and they found these results the matured fruitage of indigenous institutions which had taken firm root on French soil. They found on instituting a comparison, in very many instances, British workmen imperfectly taught, and to a great extent ignorant of the economy of human effort,—often working under foremen chosen more for ability to keep accounts than from any superior knowledge or power to direct. In either case, they found few reaching above the level of mediocrity, or receiving any stimulus beyond mere wages to develop the faculties with which God has enriched them, and which, if fully cultivated, would increase the means of individual happiness, and add to the prosperity of the country.

If it were necessary I might add my own experience to the weight of evidence; I might refer to works, a large portion of the productions of which find purchasers among the more wealthy and refined of the very highest classes of this country, and show how slight are the provisions or guarantees that the productions, from the first stage to the last, shall become articles of taste; also how, among even the best workmen, eight out of ten find themselves at fault every day of their lives for want of a knowledge of first principles, having to grope their way and flounder on, ever copying others' copies, and rearranging old materials into stiff and lifeless forms.

This view of the case is to some extent borne out by the report of the judges appointed by the Society of Arts, as to the result of last year's competition for prizes for works somewhat allied to designs. The report states that "indications were given in last year's competition of a power and disposition on the part of the competitors to execute meritorious works other than those in accordance with prescribed designs; and the Society consequently extended its invitations in that direction. The result had, however, scarcely realised expectation, since, with few exceptions, the works wrought in accordance with prescribed designs were in all respects superior to those in which the workman had followed his own inspiration. That circumstance pointed forcibly to the weak side in the present condition of the training, or want of training, of the Art-workmen. His knowledge of the functions, capabilities, and right application of the processes he employed with so much dexterity was greatly in arrear of his taste and knowledge of the principles of design. His head did not keep pace with his hands. The addition of a small amount of knowledge of the elementary principles of the theory of design would have, in many cases, prevented the considerable waste of ingenuity and labour shown in many of the subjects which had not followed any prescribed design."

But it is not only on matters strictly relating to art manufactures, but in other departments of industry, such as those in which science was in request, that we found a large number of gentlemen who visited the late Exhibition, including eminent manufacturers, school inspectors, members of the Privy Council, and others who might be supposed to give an unbiased opinion, concurring in the unpalatable admission that other nations had been more successful than ourselves. And there can be no doubt but that this superiority arises from the facilities which the workmen of the Continent enjoy over our own for obtaining necessary technical instruction in their several departments.

On this subject I might quote favourably from reports of artisans published by your Society, but as these must be familiar to the members, I will take one which appeared in the *Birmingham Post*, written by Mr. Spencer, national schoolmaster, of Oldbury. Speaking of France, he says:—

"Where must we look to find out the secret of our neighbour's success? Must we simply study the marvels of science stored up in the Exhibition? It would be like examining a river at its mouth to become acquainted with its character and peculiarities, instead of going in the first instance to its source. The Exhibition is merely the effect of a cause; hence to form a correct judgment we must go to an examination of the course of education received by the children of the Parisian artisans, for herein is the key to unravel the mystery. Having this object in view I found a school in Paris corresponding to our national schools. France has, I am aware, institutions of greater pretensions, but as I wish to compare that with the school of which I am a teacher, and which is primarily intended for the instruction of the children of our artisan population, I preferred visiting such a class than that of a higher standard. Great prominence," he says, "is given to art in French schools, and very great efforts are made to give a good idea of drawing to all children under instruction. The school is visited twice a week by an Art master, and during my stay I had an opportunity of witnessing the work for myself. In a school of 190 boys, nearly 100 of them were making drawings of an advanced kind." He says, "I also visited another school attended by 830 children of the working classes, whose ages range from 12 years and upwards, and supported by subscriptions and town grants. It was, in truth, an industrial school on a large scale, and the admirers of 'technical education' would be highly gratified at what they could witness. I do not hesitate in saying that such a spectacle could not be witnessed in England. To watch these children at work in their Art School would really astonish one. The results were splendid, and the most sceptical, after visiting this institution, cannot but affirm that France must maintain her present proud position while her youths are educated so wisely and so well. The shaded, architectural, and machine drawings would do credit to any School of Art in England. Connected with this institution are workshops, rented by master men, who undertake to teach the boys the various trades: two hours daily are allowed for instruction. There was also a designing room, and I observed boys of 15 years making designs of most exquisite patterns, and combining the colours according to their own judgment. I was informed there were 130 learning trades; three years were spent in the workshop, and each child could select his own occupation. I cannot but think if schools of this nature, where education and work are combined, were introduced into England, they would have a very beneficial effect, and would tend to elevate her from her present position."

I heard an English workman observe in Paris, that there is much more credit due to an English workman if he is clever, for a Frenchman has so many advantages that, if he only have moderate talents, he can scarcely help but be a good workman. He has excellent schools to give him a technical education, and go where he will there is something to educate his eye, and elevate his taste.

It is my decided opinion, that whatever the means suggested for supplying the deficiencies of technical instruction, they should be in the hands and under the control of Government. The voluntary system with regard to education, notwithstanding the sectarian stimulants applied, has signally failed; and the part-voluntary scheme of Art education has proved inefficient. In few places, if any, are Art Schools supported as they ought to be, whilst in some, as in the Borough of Wenlock, several have been closed altogether, and those still open are chiefly attended by amateur ladies and others above the class of artisans. Even where successful, in the

large towns, the burden falls unequally. One manufacturer, fully appreciating the importance of Schools of Art, subscribes liberally from a sense of duty; another, more selfish, makes up his mind to wait till his neighbours' subscriptions have educated the most promising student, in order to outbid him in the wages he will offer to secure him.

Gentlemen,—It is important to know our deficiencies; and it is encouraging to know that side by side with these, agencies are at work for remedying them, and that there is a willingness on the part both of the governing powers and of the public of this country to multiply and perfect such agencies. Government, indeed, has hitherto been in advance of the people to a certain extent on these points; and it really is to the governing power that we must look, rather than to local effort, for the means of placing the Art-workmen of this country on an equal footing with their rivals on the Continent. To accomplish this, to call into action those unstirred forces that yet lie slumbering, as it were, among the primary elements of our nature, will require not only all present educational agencies strengthened and expanded, but supplemented by others. Give to the Englishman the same opportunities of enlightenment and instruction as to the foreigner, and there is no branch of Art and Science, no human industry requiring taste and skill, in which he will not shine pre-eminent.

Much, unquestionably, has already been done within the past few years; and fortunately, too, it has been done so as to form a sound basis for what more is required. The national system of education, in affording to a great extent the means of procuring instruction, has sent a more intelligent class of boys into our manufactories. The half-time system, properly apportioning the hours of education and labour, at an age when the physical energies of the child are unable to bear too great a strain, and the mind is as yet easily susceptible of impression, together with Schools of Art in connection with the Science and Art Department, are exercising an extensive healthy influence on our manufacturing industry. The influences of the latter are already telling in a very perceptible degree in manufactories wherever young men are found willing to avail themselves of the advantages neighbouring schools of design afford; the effects being observable in a freedom, yet correctness of outline, and boldness of execution not otherwise readily attainable. And although such schools have not hitherto succeeded in attracting the working classes to the extent their promoters had reason to expect, yet the numbers attending them through the country are on the increase; and it is worthy of remark that those who show the greatest desire to avail themselves of their advantages are they who first commenced drawing in the National Schools. These feel a pleasure in their work, whilst elder boys and young men experience a delicacy in sitting down with those by several years their juniors, but more advanced, perhaps, in the art of drawing than themselves.

The conclusion seems natural that the seed of a Scientific and Art-education, such as the country requires, must be sown in the national or primary school, either by the schoolmaster or by supplementary teachers. What we complain of, and what the country, raising the taxes to support the present system, complains of most is that it is too much in the hands of the clergy, and under inspection by men drafted from them, men who are neither qualified by their education, their callings, nor their sympathies for appreciating the importance of that secular knowledge which is so essential to the social well-being of the children committed to their care, and who are under a temptation to use it as a proselyting scheme, rather than an engine for fitting children for their duties. What we want is for the State to carry out its own admitted principles; to furnish that education which it professes to give, which it admits is essential to the commonwealth, instead of going a round-about way and giving something else. Government in effect now says:

Education is all-important; it is essential to your welfare, and to that of the public; you want it, and we undertake to give it upon condition that you take something else with it. It is the old plan of cheating the law by selling the straw and giving the book. If you are to have education you must take my dogmas with it, say the educators. Here are boys, say in a mining village, seven out of ten of whom will in all probability be employed in trades connected with the works. Does the State teach them anything as to the nature of that work, or of the mineral they work, or of the dangerous elements with which they come in contact?

The new Minute of the Committee of Council for the advancement of technical education in connection with art and night schools, by payments and scholarships, is a step in the right direction and will give a stimulus to the good work of technical training; but it will even require something more than this to overcome the inertia of existing indifference and general apathy.

Many suggestions might be made, and no doubt will be made, for remedying the present state of things. One very desirable scheme is, that there should be central district colleges, in which the science of agriculture and mining, and a preliminary knowledge of those principles of art necessary to the success of manufactures, should be taught; such colleges to have "fellowships" in connection with them, for those attaining distinction in certain branches of study.

Such fellowships would not be mere empty honours; they would give a man a qualification and a position, and would be sought after.

The Museum of Practical Geology and School of Mines are precisely what is required, so far as the information they propose to convey, and do convey, to those who attend the lectures. But it is not sufficient to lecture in London. The means of those who should be benefited will alone enable them to profit by information furnished in their own districts. I have heard Professor Percy lecture in Jermyn-street on coal to less than twenty persons, out of three millions of inhabitants of London; and one-half of the twenty probably came not so much to learn as out of compliment to the learned lecturer.

The district colleges I suggest might be situated so as to be easily accessible by railways, for classes of children of national schools, at stated periods, and for students more advanced in such studies. Such means of technical education, with sufficient incentives thereto, would both raise the character of our manufactures and of our civilisation, by profitably occupying the spare time of the operatives, by refining their taste, and by strengthening and enlarging their minds.

DISCUSSION.

Professor WILLIAMSON, F.R.S., thought everybody must sympathise with the general tone of the paper, and with many of the particular conclusions at which the author had arrived, but, nevertheless, the subject was of such paramount importance, that they could not be too careful in any conclusions, until they had most carefully sifted the grounds upon which they were based. In order to prevent, what he feared there was a little danger of, any action being taken on the advice of that most pernicious of counsellors—panic—he wished to make one statement on the subject. He believed that to his distinguished friend, Dr. Lyon Playfair, attached considerable responsibility for initiating the great movement in favour of what was called technical education. The opinions he had expressed with regard to the superiority of foreigners in the industrial arts were founded chiefly, if not exclusively, upon the observations which he made during the late Paris Exhibition; but others, who had not only seen the Exhibition, but who had also exact and comprehensive knowledge of what was doing upon the Continent, had arrived at a different conclusion. It certainly was not admitted by those who were most cognizant, not only of what science had done in any particular art,

but what practice was doing—he did not speak of the fine arts—that foreigners were at present in advance of Englishmen. For instance, in the iron trade and affiliated branches, it was considered that the progress made on the Continent consisted mainly in adopting improvements which had been known for some time in England; and moreover, that foreigners were still behind us in adopting many of the most important improvements. He thought that the very fact of foreigners not being equal to us in originality was, at least, a ground for doubting whether the system of training to which they had been subjected had been successful.

Mr. CONNOLLY (mason, one of the artisan reporters) certainly concurred in the majority of the observations made by Mr. Randall; indeed he could not, in fact, do otherwise, after spending some time in Paris during the preceding summer. It did not, however, require any comparison with foreign nations to enable them to understand that an educated Englishman must be far in advance of an illiterate one, or to discover that a man acquainted with the nature and properties of the materials upon which he was engaged, would be more capable of making a good job of them than one who was completely ignorant in that respect. Therefore, irrespective of any panic, the question was of the utmost importance, although at the same time it was the part of a wise nation to contemplate the possibility of its being outstripped by others. He believed that if they were to ever assume the place which God and nature intended they should, as the great industrial manufacturers of the western portion of the old world, it would only be when the people were fully and fairly educated. Any man who had had experience in the workshops of this country knew that there was a deplorable deficiency in the education of artisans; and sometimes he was tempted to think that the inhabitants of his native country across St. George's Channel were, in this respect, wiser twenty or thirty years ago than Englishmen were now. When he was a boy, no one in his neighbourhood would dream of apprenticing his child to any trade without giving him some sort of education which would fit him for it. If he was to be a carpenter or a mason, an effort would be made to have him taught mensuration, or as much of that science as the country schoolmaster could impart; and he had been surprised in the workshops of London to find how many men there were, engaged in occupations that required the greatest amount of skill, completely illiterate and destitute of any knowledge which could guide them in the prosecution of their art. In his own trade—that of a stonemason—he had often seen a shop-foreman spend hours over a stone, showing the man who was to work it what was required, and drawing lines upon it for that purpose; and it was often quite a puzzle between the man and the foreman what direction these lines should take. There was not more than one foreman in twenty that could take a pencil and make a plan and section of what was required to be done; and if there were more, not one man in a hundred would know what was meant. If the foreman had sufficient education to be able to communicate his ideas to the workman by drawings, and if the workman were able to understand the drawings, an immense deal of time would be saved, and work would be better done; but at present they both had, to a great extent, to grope their way in the dark. He contended that the nation ought to supply this education, and that it would be economy on its part to do so. He must differ in one respect from the reader of the paper, and that was as to the religious element in teaching. He could not ignore the benefits which art had received from religion. Everything grand and noble in it had been the result of the action of religion upon the human mind. The noble buildings which studded the face of the country like gems in a diadem, arose out of the religious enthusiasm of the middle ages; and were they to believe that that same spirit was dead in the people of England? No, it only slept; and when it was once more aroused, the same zeal and enthusiasm which

enabled the English of bygone days to vie with foreign nations in art, would still, with the help of other influences, produce the same results. It was remarkable that the school which was referred to by the writer in the *Birmingham Post* as attended by 830 children, was under the management of the Christian Brothers; and surely, in the face of that fact, whatever might be the faults of country parsons, it would be hard to blame religion itself. Religion and education, he thought, should work hand in hand; and an artist would be none the worse for being a good Christian. He recommended that the movement now initiated should never be lost sight of until every workman had the fullest opportunity of being instructed. It was quite true that you could "take a horse to water, but you could not make him drink;" still, it would be a fine thing to have the water there, at any rate, and then if he died of thirst it would be his own fault. The most difficult part of the problem concerned the education of the present generation of working men. They could not begin with their primary education, and, therefore, in all great centres of industry there ought to be museums and libraries established, to which access could readily be obtained. He lived at Lambeth, in which district there was as intelligent and skilful a population of working men as could be found in the world, but if he wanted to consult a book on any particular subject he had the greatest difficulty in obtaining it. He thought they ought to have, in some central situation, a large establishment, consisting of a museum adapted to the requirements of the neighbourhood, a lecture room, and reading and class rooms for instruction. For education, like all other things, there must be an inducement. The publican, although his liquors in themselves were in great request, yet added as much as he could to the external attractions of his establishment; and on the same principle he did not see why educational establishments should be pushed back into holes and corners, where they were very hard to find, instead of being put in a commanding situation, and so conducted that a man might at any rate be more comfortable there than whilst at his daily labour.

Mr. R. M. MORRELL, who said he had been apprentice, workman, and foreman for twenty-five years in the jewellery trade, and who had had this subject under his notice for a considerable period, inclined more to the views expressed in the paper than to those they had just heard. He thought it was too late to begin to educate when they got to adult workmen; they must begin at the beginning. With respect to exhibitions, he wished to say a word. For the Exhibition of 1851 the establishment with which he was connected did a deal of work, which was exhibited in the cases of various London goldsmiths as English workmanship, but one-half of that establishment consisted of foreigners, and the foreigners made the designs and did all the artistic portions of the work, whilst the Englishmen only did the straightforward part, that which might almost be compared to the carrying of the bricks and mortar by the labourer for the use of the bricklayer. The foreign workmen received from 15s. to £1 a week higher wages than the English, and many of them had since gone over to New York, and were now in business there, employing a considerable number of hands, so that the work which used to be manufactured in England and sent to America was now made there, and this was one reason of the depression of trade which had been complained of. Not one of the Englishmen in the shop of which he was then foreman could make a drawing, but all the foreigners could do so if called upon; and upon asking these men the reason for this difference, they told him that on the Continent schools of art, &c., were open free to the working classes, and everything which would tend to their mental improvement was accessible to them at times when they could avail themselves of it. In addition to that, if a pupil really showed a decided aptitude for art, he was taken in hand by the government and sent to Rome, where he received a much higher education. He could not help comparing that system with the one which prevailed here.

Boys were apprenticed without any trouble being taken to ascertain whether they had any taste for the trade, simply as a mode of getting a living, and were kept by their employers running about on errands for two or three years, without any attempt being made to teach them their business, and without any idea of sending them to a training school. It would be of no use establishing schools of design, unless both in parents and employers was implanted a desire that the boys should attend them. Employers at present seemed to care nothing about it, but found it more to their advantage to employ ready-trained artisans from abroad. Would it not be far better that the youth of England, instead of standing about the corners of the streets on Sundays, insulting the passers-by, should have opportunities of going to museums, and other places where they might improve their taste, and obtain useful knowledge? In an article by the Editor of *Lloyd's Newspaper*, the other day, it was stated, and with truth, that until the love of art was implanted in the population they would never make much progress, and his opinion was, that that could best be accomplished by means of secular schools. His (Mr. Morrell's) own youth was spent in a national school, and, being made monitor at the age of twelve, he was employed day after day in teaching a junior class the history of the wanderings of the Israelites in the desert. What would have been his present position had he not been so fortunate as to get hold of better instructors? At present there were no inducements to youth to take to art pursuits, but every difficulty was thrown in their way. Unless they could get government, parents, and employers, to unite in the good work, in his opinion all their efforts would come to nought.

Mr. JACOB (cabinet-maker, one of the artisan-reporters) remarked that one great advantage which it had struck him during his visit to Paris the French workman had over the English, was the opportunity of visiting museums and galleries of art at times convenient to himself. They could only visit the British Museum on certain days in the day time, which was practically equivalent to excluding working men. The influence of the clergy would probably be exerted to prevent the opening of such institutions on a Sunday, and even if they were open of an evening, he would ask anyone who worked for eight or ten hours a day as he ought to work, if he then felt fit to go to a museum and study. He had tried it, and found great difficulty in deriving much benefit from his visit. The museum of South Kensington had certainly done more than anything else to improve the artistic taste of the working classes, but much more might be done, and as one means he would suggest the supplying copies of plaster casts at cost price, for in many cases no drawings would convey the same idea to the mind as a cast. Again, the knowledge of geometry and orthographic projection was difficult of attainment, and the books from which it might be learned were costly; yet without some acquaintance with these subjects it was difficult to make a workman understand a working drawing. He suggested that sheets of such projections should be issued at a low price, so that they might be introduced into workshops, and that men might become familiarised with them. With reference to what had been said by Mr. Morrell, he might remark that he knew several young men in the jewellery trade by whom he had been told that they experienced the greatest difficulty in obtaining information connected with their business, and that it was not until they were turned 21 years of age that workmen would notice them at all.

Mr. JUNE (watchmaker, one of the artisan-reporters) gave an outline of the system of education in Switzerland. Instruction was provided by the Government, was compulsory, and every one, rich or poor, was obliged to send his children to school. From the age of 7 to 12, the child must go to a day-school, and from 12 to 16 he must go to either a morning or evening school. He thought people in England often sent their children to school too early and took them away too soon; many were sent at four years

old, but the result was, that instead of learning anything their education was really retarded. It had been found in Switzerland that a child sent to school at four and remaining till he was nine, knew very little more than one who did not go to school until he was seven or eight and remained a year or two. A child at 10, 11, or 12 was just beginning to understand what he was learning, and ought not then to be taken from school. In Switzerland, again, geometry was taught in a more practical way than was usual in England. Once a week they were taken out in the fields, where they measured the ground, and on coming back they had to draw the plan, and to calculate the area of surface. The same with timber measuring and other practical matters. This was the sort of school he attended, some years ago, in a little village with only 3,000 inhabitants. Those who distinguished themselves in the village school were sent to a district school, and thence again those who distinguished themselves were promoted to a canton school. He did not believe that in the whole of Switzerland, except possibly in the highest parts of the Alps, there was any one, under the age of 30, who could not read and write. At these schools also they would be taught one or two modern languages, and though he did not say this was necessary, it was very useful, particularly in removing prejudices. When a man knew the language of a people, then only did he begin to understand them, and to appreciate their character. Religious teaching was given to a very small extent in Swiss schools, which might practically be called secular. He differed from Mr. Connolly as to the beneficial results of the efforts of the Christian Brothers, for he believed statistics would show, in France, Germany, and Switzerland, that where they had the management of the schools not much science was taught. Technical education was to a large extent positive science, which religion was not, and he did not see how the two could be mixed up together. He believed the many different forms of faith in England had prevented the national system of education taking deeper root, and he should therefore be in favour of secular schools, which would still leave abundance of opportunities for religious instruction. Some ten or twelve years ago primary instruction in France was very much in the hands of the priests, and for that reason it was much neglected, but the more advanced stages of education were better provided for. There were various courses of lectures, such as that of the Sorbonne, to which working men had free admission, only paying a nominal sum if they wished to compete for prizes. He believed that if similar facilities were given in England, they would be taken advantage of, and in conclusion he would remark that if, in some respects, the English workmen were behind their Continental brethren, in others they were far before them. For instance, they saw and acknowledged the progress which had been made by other nations, which Continentals, especially Frenchmen, were very slow to do. If the English workman had fair scope given him there was no doubt but that he had a bright future before him.

Mr. MACKIE (wood-carver, one of the artisan-reporters) agreed with Mr. Randall as to the necessity of well instructing youth; the lessons received when young were the most valuable, and would last the longest; but he thought there was an omission in the paper, viz., as to the necessity for establishing museums, &c., all over the country. He was perhaps rather sanguine on this point, but he believed that if they were established a real change for the better would soon be perceptible. Too much stress could not be laid upon the importance of early special training in accordance with what was to be the future work of the individual through life, but yet those who were already grown up should not be left to grope their way in the dark. A good deal was said sometimes about the force of genius, but the genius which forced its way generally had obtained its knowledge by mere chance, and what was wanted was a system which should give the same or better opportunities to all, so that those who had

genius might at least have an opportunity of showing it. They certainly wanted something more than local effort. Government might beslow to move, but local effort would be slower, and he would strongly urge the necessity of something being done immediately, or else they might realize the truth of the old proverb, "While the grass grows the steed starves."

Mr. B. LUCRAFT (chairmaker, one of the artisan-reporters) would like something done for the men of the present day. Of course he agreed with all that was proposed to be done for the technical education of the rising generation, but even these, when they grew up, would require museums and libraries, and what would be good for them then would be good for working men now. If trade and commerce were likely to suffer, as some said, from the deficient education of English workmen, there would be but a poor chance of preserving it for fifteen or twenty years, while a new generation were receiving their instruction. Again, if they had been neglected up to the present time, that was no reason why they should be so for the future. He considered it was a disgrace to the country that the working classes had been so neglected in the matter of education, but the present state of things could not last much longer. Working men would soon have the power to assist themselves, but, in the meantime, their friends—and they were many—were willing to help them now, and he was very glad to see it. He wanted to see the governing class take the matter in hand at once, and say—"If we have neglected you in the past, it is because we have not understood what you wanted, but, now that we do, we will do all that lies in our power." If the working classes only asked for education in the proper spirit, and were determined to have it, he did not think there would long be danger of their being outstripped by foreigners. He was as much in favour of technical education as anyone, but taste could not be implanted by this means, it needed the constant sight of beautiful objects, and for that purpose they must have local museums. He was very glad to find they were going to have one at the East-end, but they wanted one over the water, suited to the engineers in that locality, and one in the north, where he lived, where the cabinet making, jewellery, and watch-making trades were principally carried on. Some talked about educating workmen, as if it were likely to lift them out of their sphere, but this was quite a mistake; he loved his own business, and he wanted to see it as much respected as any other calling, and other men did the same, and that was why he wanted museums not only in London, but in Lancashire, Yorkshire, and all the great centres of industry. He was an Englishman to the backbone, and he wanted to see Englishmen equal to any nation in the world. Moreover, he contended that working men had a right to these things if only for their pleasure—for there was a pleasure in going to such museums as South Kensington; and if there were a similar institution in his own neighbourhood he should be there nearly every night, and his children with him. He did not agree with Mr. Randall in advocating workshops in connection with schools; a trade could not be taught in school; it must come through a regular course of training; but the boy should be prepared for his trade before he commenced it, and then no time would be lost. He was astonished, when in Paris, at the skill with which he saw a boy of 14 carving; and on asking an explanation, he was informed that the friends of a boy who was to learn such a business had him properly prepared by his education before he was apprenticed, and then, instead of being kept for two or three years running errands, he commenced carving at once, and in three or four years was a capital workman, if he had any taste for it at all. In England, on the other hand, it was quite that time before they began to find out whether a lad would ever do anything at all at the trade to which he was put. He did not say that Englishmen were superior to everyone else, but he believed they would be their equals, if they only had a fair chance.

Mr. BLACKIE said only one side of the question had been looked at, and although there were good institutions in France, they were not without them in England as well; and the educational systems in Germany and Prussia excelled those of France in many ways. He considered the great want in England was the power of compelling parents to educate their children, for he had very often found it the case that artisans earning from two to three guineas a week would not pay anything for the education of their children if they could get it done anyhow for nothing. They should be made to educate their own children to a certain extent, and then government might step in and supply the deficiency.

Mr. W. ELLIOTT (die-sinker, one of the artisan-reporters) was very glad to say that his own experience enabled him to correct the somewhat desponding views as to English art-workmen which Mr. Morrell's remarks must have caused. He was intimately connected with a trade associated with jewellery—that of die-sinking and chasing—and he could say with the greatest confidence that there was no specimen of foreign work in the Paris Exhibition which would bear comparison with what had been produced for the last twenty years in Birmingham, Sheffield, and London. Again, it was not the case in his business that boys entered it in such a promiscuous manner, without any previous knowledge to fit them for it. He had worked in all the places he had just named, and in each of them it was necessary, before a boy was apprenticed, for him to show that he possessed some aptitude for the trade, and in many cases the employer fostered the art-longings of the boy by sending him to school. At a time before Schools of Design were established, his master, Mr. Wilkinson, of Sheffield, paid for two years Art-education for him by a private instructor. Some years ago he had worked for a firm who manufactured largely for the trade, and in other names they were considerable exhibitors, both in 1851 and 1862, but they were not indebted to foreigners either for designing, modelling, or chasing, and in fact there were but two foreigners in the establishment, numbering about 80 in all. He thought such opportunities as he had enjoyed through the kindness and generosity of his employers ought to be within the reach of all.

Mr. J. HERMANN said that some time ago he offered his services to the committee of the Horological Society, to conduct a mechanical drawing class, and the result was, that after publicity had been given to the matter for six months, they could only muster a class of seven, three being apprentices, and only one of the number being engaged in the manufacturing department of their business, the others being what were technically called "jobbers." He found that the adults paid far more attention than the apprentices, which probably arose from their feeling the necessity of theoretical instruction. But it was rather late in the day for a young man to seek for theoretical knowledge at the time when he ought to be in possession of it, and therefore he thought technical education ought to commence at the beginning of apprenticeship, as was the case in Germany, where seven or eight hours a-week were devoted to that purpose. An apprentice was bound by his indentures to obey the lawful commands of his master, and he did not see that there would be any despotism in inserting a clause that he should attend an evening school for a few hours every week. He (Mr. Hermann) had been subjected to compulsory education, and he only regretted now that he had not been compelled to learn more than he had.

Mr. G. LOCK observed that the attention of the speakers and of working men generally, did not seem to have been directed to one very important point, viz., the means of obtaining the education which they were seeking for themselves and their children; and as they had shown such aptitude in devising schemes for political reform, he thought they might usefully devote their attention to the best means of providing the necessary finances for a national system of education. Nothing had yet been said

as to how either the schools or the teachers were to be provided, and it was a well-known fact that there was a difficulty in obtaining efficient teachers for the present schools, so that any national scheme must include provision for more normal training schools. It was very important to consider whether the means should be provided by the Government or by local rates, and unless it were done by the good-will of the people, there would be as much opposition as there had been to other measures for the benefit of the poorer classes. Not long ago there had been quite a commotion in Hackney in consequence of a number of persons being summoned for poor-rates who had not been accustomed to pay them; and when an attempt was made in Marylebone some years ago to establish a free library, it met with the greatest opposition, and ultimately failed, because the inhabitants would not submit to a rate of $\frac{1}{4}$ d. in the £ for its support. These free libraries had been established in Liverpool, and in many other large towns; and educational institutions, such as had been described by Mr. Connolly, were much better supported by workmen in Liverpool, Edinburgh, and Glasgow, than they were in London. From what had been said it would almost appear that there were no evening schools in London, and that if there were, there seemed to be something in the climate which rendered a man, when he had done his day's work, totally unfit to learn anything at all. He had resided in Paris a year or two, and he found workmen there quite as willing to attend evening school as they were in Edinburgh; but this certainly was not the case in London; for every one who had had any experience in the matter knew that the majority of attendants there were not workmen. There always seemed a difficulty in meeting the class prejudices and opinions of the men, and unless these were all consulted, there was no getting them into the schools at all; they did not like meeting with boys or with men of other trades, and that would be one very important practical point to consider, how the men and boys could be induced to enter the schools when they were established.

Mr. PETER GRAHAM, referring to the attempts to establish a free library in Marylebone, remarked that the act applicable to these matters was only permissive, and could only be carried into effect by vestries on a majority of a meeting of householders desiring them to do so. He had taken an active part in the effort alluded to, and the fact was that the largest room at their disposal—the workhouse school-room—was densely filled before the meeting began with keepers of small coffee shops, newsvendors, and so on; and the most eloquent speaker could not obtain a hearing. That was the result of permissive legislation on this subject.

The CHAIRMAN said that whether they were in favour of beginning in primary schools, of educating the adults in evening schools, or of giving working men opportunities of seeing and studying works of art, all were unanimous that some technical education for the great body of the artisans of England was necessary. The new East-end museum about to be established would be the result mainly of one gentleman's exertions (Mr. Antonio Brady), but such things ought not to be left individual effort; public opinion generally ought to assist the working men in every locality in inducing the Government to grant them a bill for the purpose of acquiring the necessary land to establish such museums in various quarters. There was no doubt that half-a-dozen museums could be supplied with casts of the finest works from South Kensington; and in the British Museum there were thousands of works of art and interesting objects in the cellars which ought to be distributed all over the country; and in the National Gallery there were an immense number of paintings hidden, which would immensely benefit the working classes if they could be seen. It was not too much to ask the government to take some steps by which these valuable collections should be utilised for the benefit of the nation at large, especially of

large centres of population and industry, such as Sheffield, Birmingham, and Manchester. While he fully concurred in the opinion that this kind of education was necessary he totally dissented from the conclusions arrived at by Dr. Lyon Playfair, and had stated so in that room soon after the first appearance of that gentleman's letter. Foreign workmen had much improved since 1851, and had approached nearer to the English; and if we now stopped short, there was no doubt that in a short time they would surpass us, but so long as there was English industry, English skill, and the determination on the part of English workmen to educate themselves—even if the Government would not educate them—he had no fear of any foreign country surpassing us in the great manufactures of the world. It did not look much like being beaten by foreigners when the commerce and manufactures of England had increased more in the last ten years than all the rest of the world put together, and more rapidly than at any previous period. He could not despond, unless he believed that the English workman had forgotten his duty to himself, his own class, and his country; and while they found amongst them such men as the reader of the paper this evening, he could not join in the conclusion of Dr. Playfair, or believe that England would lose her present position. He was sure they would be unanimous in according a hearty vote of thanks to Mr. Randall for the paper with which he had favoured them.

The vote of thanks having been passed,

Mr. RANDALL, in acknowledging the compliment paid to him, wished to correct a wrong impression which seemed to have been produced—that he was not a friend to religion. It would be sufficient to show that this was not the case, if he mentioned that he and his wife were members of the Church of England, that he had three daughters school mistresses in national schools, and one son a pupil teacher. He, therefore, knew something of the system of which he had spoken, and he knew that religious prejudices did interfere with the proper education of the country. The children were divided amongst several schools of different religious denominations, whereas if religious teaching was altogether left out, they might meet in one common school, and a higher class of teachers might be employed with profit to the children taught. It was quite usual, especially in country parishes, for a clergyman to speak of "my school," and "my schoolmaster," just as if the whole establishment was under his sole control. He quite agreed with the idea that district museums and colleges should be established; and those who were even now disposed to think well of us as a nation, should consider, if we had done so much under present circumstances, what might we not have done with the advantages which foreigners possessed. He thought it would be well if these district colleges had the power of conferring honorary distinctions upon such men as showed themselves worthy of them in their particular calling. He had been made a fellow of the Geological Society in consequence of his studies in that science, which he looked upon merely as a recreation; and if some similar distinction were awarded to men who devoted their energies to the attainment of excellence in their own particular business, it would be likely to have a very beneficial effect, especially on the rising generation of artisans.

AGRICULTURE IN FINLAND.

From a report by Mr. Campbell, Her Majesty's Consul in Finland, it appears that great suffering and distress has of late years occurred in the northern districts of Finland, and more particularly in the government of Uleaborg, in consequence of the failure of the crops. Since the year 1856, when a total failure of the harvest took place, the country has more or less suffered, partly from the total exhaustion of any surplus grain which the peasantry might, under other circumstances, have been in possession of, and partly from deficient harvests result-

ing from inferior seed. In 1862, however, a total failure again occurred, which was succeeded in 1863 by a partial failure. The year 1864 brought a miserable harvest, and 1865 brought once more a total failure, the consequence of which has been that from one end of the government of Uleaborg to the other, a degree of suffering, sickness, and misery altogether unprecedented has resulted. Under these deprivations the bread of the peasantry consisted of bark and straw, either separate or mixed; the former is the inner bark of the pine tree (*Pinus sylvestris*) which is collected during the months of June and July; this bread produces much disease and sickness, but still it is considered more wholesome than another description produced from boiled hay.

The severe and unpropitious climate of Finland proves the greatest impediment to the progress of all agricultural pursuits, and for a series of years there has not only been a partial, but frequently a total failure of the crops in the northern provinces; and notwithstanding the large sums which are annually spent by government in endeavouring to dry the extensive morasses in those districts, it is sadly to be feared that Finland will not be able to produce a sufficiency of grain for its own requirements.

The Administration, however, appears determined, through science, to do its utmost to cope with this natural impediment to cultivation, and in order to carry out its projects has erected and endowed the following agricultural schools throughout the country:—

1	In the government of Wiborg.
1	" " " St. Michael.
2	" " " Kurpio.
3	" " " Uleaborg.
2	" " " Wasa.
1	" " " Nyland.

Besides these schools, and by far the largest agricultural institution in the country, is that of Mustiala, in the government of Wasa.

The course of instruction in that institution is conducted in two departments or classes. In the first of these the student is taught practical farming, veterinary surgery, cattle breeding, &c., &c., and moreover, he must practically assist in the building of houses, and in the construction of all implements necessary for agricultural purposes. To this department 40 students are admitted: that is to say, 30 from the governments of Nyland, Abo, and Tavastehus, and 10 selected from the above-mentioned schools. In this department students receive instruction, as well as board and lodging, free of any charge.

In the second, or theoretical department, the students are taught geometry, stereometry, planimetry, mineralogy, and zoology. To this department 24 students are admitted, who have to pay an annual fee of £25 each.

As a proof of the energy with which the government has lately turned its attention to the agricultural interests of the country, I may mention that, in the budget for 1853, the sum required for the agricultural institutions of the country was 5,428 roubles, and in 1860 it had increased to 36,610.

Manufactures.

NEW MACHINERY FOR ROLLING THE TEA LEAF.—The *Indian Daily News* describes a tea leaf rolling machine, which consists of one or more discs rotated horizontally over a surface on which the leaves are placed. This surface, which represents regular lineal indentations, is covered over with fine matting, and its relative distance from the revolving disc is under control. The latter is bound with a loose rim, which adjusts itself to the space between the disc and the lower surface, and thus imprisons the leaves whilst being rolled.

ECONOMISING CARBONIC ACID GAS.—A French chemist, named Noël, has arranged a system of economising the carbonic acid produced during the operation of fermentation, for the production of bicarbonate of soda. The fermenting vats are closed, being furnished with a trap, through which the operation may be watched from time to time, and also with a force-pump which conveys the gas into a special reservoir provided for the purpose and connected with a barrel containing the alkali. The gas is made to enter the latter at the lower end, and the air is allowed to escape at an orifice at the top; when, instead of atmospheric air, carbonic acid issues from this orifice, the operation is terminated. The water of crystallization is withdrawn by means of a tap at the bottom of the cask, and this is afterwards treated separately with carbonic acid. M. Noël proposes to convert the alkali in the barrels in which it is afterwards to be sent out, there being nothing to be done but withdrawing the tap and closing the two holes.

FRENCH MANUFACTURES.—The last annual report of the Industrial Society of Mulhouse furnishes some interesting information relative to French industry. There were in the department of Haut Rhin, on the 1st January, 1867, 436 establishments, with 652 steam-engines of 15,067 horse-power. Of these, 197 were devoted to spinning and weaving; 51 to printing, dyeing, dressing and bleaching; 31 foundries, hardware, and other iron-works; 65 factories for felt, cloth, wadding, ribbons, paper, and rope-making; 21 chemical works, distilleries, starch manufactories, chemical matches, gas works, &c.; 56 breweries, saw-mills, tanneries, &c., and 15 brick, tile, plaster, and cement works. There were 105 cotton mills with 1,529,378 spindles, and 125 with 30,421 mechanical weaving looms. On the 1st January, 1868, there were in the department 929 boilers with 1,737 receivers, and 674 steam-engines of an aggregate horse-power of 15,293. Among the corresponding members elected last year were Mr. P. L. Simmonds, and Dr. Forbes Watson, of London. In the annual report of the society mention is made of a new red-and-violet aniline, found in the natural state in the vesicle of a mollusc *Aplysies depilans*, which is met with in great abundance in the Mediterranean and on the coasts of Portugal. Mr. E. Kopp has brought into successful application extracts of madder for printing fabrics. He obtains commercial purpurine, which is used in dyeing silks and wools, and in the preparation of very handsome red lakes and pink madders. Green alizarine, which serves as the first matter for preparing pure alizarine extract; for printing violets and lilacs, and, finally, a pectic extract, with which is prepared a composite alizarine extract for printing reds, pinks, puce, &c. Mr. O. Scheurer is the person who has just brought into successful application, for commercial purposes, surface-printing with madder colours. The society has voted a first-class medal to M. Pernod for the successful application of an extract of madder to painted linens.

Commerce.

SWISS COMMERCE IN 1867.—The exports and imports in Switzerland during the year 1867 were as follows:—Imports.—Cattle (small), such as sheep, &c., 123,078; cattle (large), 49,863; coal and turf, 338,878 tons; raw cotton, 338,087 quintals; cotton yarn, 12,776 quintals; cotton fabrics, 39,306 quintals; grain, 3,683,378 quintals; flour, 302,048 quintals; rice, 91,150 quintals; coffee, 161,247 quintals; sugar, 236,905 quintals; wine in barrel, 798,632 quintals; metals (excepting iron), 41,913 quintals; iron (manufactured), 270,469 quintals; iron (raw), 269,192 quintals; machinery, 58,367 quintals; silk (raw), 21,371 quintals; silk goods, 1,512 quintals; soap, 30,306 quintals; wool (raw), 19,970 quintals; woollen fabrics, 39,593 quintals; tobacco (in leaf), 82,976 quintals; tobacco (manufactured), 17,644

quintals. *Exports*.—Cattle (small), 54,309; cattle (large), 66,109; grain, 36,078 quintals; flour, 46,609 quintals; butter, 10,309 quintals; cheese, 396,774 quintals; dried fruits, 5,025 quintals; wine, 4,774 quintals; vermouth, 3,754 quintals; hides and leather, 53,283 quintals; articles in wood, 15,602 quintals; raw iron, 24,741 quintals; manufactured iron, 25,725 quintals; machinery, 68,879 quintals; cotton yarn, 67,911 quintals; cotton fabrics, 209,919 quintals; silk fabrics, 32,751 quintals; articles in straw, 7,917 quintals; clocks and watches, 3,837 quintals; tobacco (manufactured), 5,705 quintals; woollen goods, 2,965 quintals. The following was the weight of cattle of all kinds passing through Switzerland during the year—108,744 quintals, and 1,427,705 quintals of goods of all kinds.

TELEGRAPHY IN SWITZERLAND.—The reduction to half a franc for a telegraphic message in Switzerland has not proved a failure as was anticipated by many persons. In January, 1867, the number of telegraphic despatches throughout the country was 50,513, against 86,461 for the same period in the present year. In January, 1867, 19,250 intimation despatches were sent, against 20,077 in January of the present year. Comparing the amounts received, it will be seen that the revenue has not been diminished in consequence of the reduction of tariff. In January, 1867, the receipts were 59,628 fr. 69 c., against 65,329 fr. 35 c. during the same period this year.

SILK TRADE IN ITALY.—The following statement shows the comparative exports and imports of silk in Italy from 1863 to 1866:—

<i>Raw and Spun Silk.</i>			
	Imports. kils.		Exports. kils.
1863.....	1,820,700	....	2,553,970
1864.....	1,517,470	....	2,273,240
1865.....	1,136,790	....	1,529,360
1866.....	643,780	....	1,777,070

<i>Floss Silk.</i>			
	Imports. kils.		Exports. kils.
1863.....	..	....	1,464,980
1864.....	..	....	2,382,950
1865.....	1,068,740	....	1,173,430
1866.....	84,460	....	1,663,840

BRAZIL INDIA RUBBER.—This is the most important article of export from Para, on the Amazon. Its production, however, has contributed much to give to the originally quiet inhabitants a taste for a restless and wandering life, and has deprived other branches of agriculture of labourers. The rubber-tree grows mostly in very unhealthy situations, and in marshy soil. Intemperance, bad nourishment, and the malaria on the banks of the rivers, shorten the lives of the men engaged in the extraction of this elastic gum; yet so great are the profits to be obtained, that hundreds of canoes cross every year from the left bank of the Amazon to the islands and to the forests around Macassa, in search of rubber. No precautions are taken to preserve the trees, and from this cause already some districts produce a much smaller quantity than formerly. The tree, however, grows in great abundance throughout the whole valley of the Amazon, and on the banks of the tributary rivers. The exports from Para were, in 1864, 183,206 arrobas; in 1865, 256,967; and in 1866, 291,091 arrobas. The arroba is about 32½ lbs.

Colonies.

SUGAR IN NATAL.—The *Natal Mercury*, of Jan. 11th, says:—"Turning from the treasures under the soil to the wealth growing upon it, we find no less than in past years evidences of progress. In spite of all drawbacks, and amidst all circumstances, the agricultural interests of Natal have worked ahead. Sugar planters have not for years been in such good spirits, and so confident

regarding the future, as they in most cases appear to be at this time. The crop, for one thing, has turned out better than was expected about the middle of the year. Although an unusually late season, the yield has been, on several estates, above the average. Were it not for the heavy burden of debt resting upon them—the result of advances obtained at high rates of interest, for the purpose of erecting mills and forming plantations—our planters would be the wealthiest class in the community. When the day comes that capital can be got at low rates, no enterprise will have a fairer prospect than this. Markets, moreover, have been better than they had been. Buyers from or for the Cape Colony are constantly in quest of shipments. The home prices are a little better, and the quality of the sugars made here is being so much improved, that we hope in time to acquire a good name for Natal brands. It is possible that, ere the year be out, new markets will have been found in India and Australia for the sale of our sugars. The newspaper war sometime waged between different planters, regarding modes of manufacture, if occasionally acrimonious in its tone, has at any rate a wholesome effect in stimulating emulation, and promoting an improvement in quality."

Obituary.

M. LEON FOUCAULT, member of the Academy of Sciences and Bureau des Longitudes, of Paris. M. Foucault is best known by his demonstration of the rotation of the earth by means of the pendulum, first exhibited in the Pantheon of Paris, in 1848, and afterwards at the Great Exhibition, in London, in 1851; but he made many important applications of science, and his premature death, at the age of 49, is a loss to the world.

SIR CHARLES LEMON, Baronet, died on Tuesday, 11th February, in the 84th year of his age. The deceased baronet, during his long life, had been of eminent service as a county gentleman, and conspicuously so in political affairs, and in connection with the scientific institutions of Cornwall. Sir Charles Lemon was born on the 3rd of September, 1784, and was the second baronet, having succeeded his father in the title on the 11th of December, 1824. He married, in 1810, Lady Charlotte Ann Fox Strangways, youngest daughter of the Earl of Ilchester, and who died in 1826. Sir Charles has left no surviving issue; his second son, and last remaining child, was unfortunately drowned whilst bathing, when at Harrow School, on the 18th April, 1826, in the thirteenth year of his age. The deceased baronet was a Deputy-Lieutenant of Cornwall, and a special Deputy-Warden of the Stannaries. He represented the borough of Penryn from 1809 to 1812, and again in 1830. He was member for the whole county in 1831, and after the passing of the Reform Bill, when the county representation was changed to two divisions, he represented West Cornwall, in conjunction with Mr. Pendarves, until the year 1841, and again from 1842 to 1857. Sir Charles was a reformer, but rather one of the moderate Whig school, than of the more advanced politicians who are to be found in the Liberal ranks at the present time. He was President of the Royal Cornwall Polytechnic Society, and in former years of the Royal Cornwall Geological Society, and, as F.R.S. and member of other learned societies, he was ever deeply interested in the researches and advancement of science and the arts. He was also a zealous Freemason, and Provincial Grand Master of Cornwall for many years. Sir Charles was also Chairman of the Falmouth Board of Guardians; he was elected at the formation of the Poor-law Unions in 1837, and, although unable for some years to attend the meetings of the Board, he has been re-elected year after year, as a mark of personal respect. His sound sense gave great weight to his opinions, and rendered his services valuable in the promotion of local interests, of which he was ever mindful, as well as of the general

welfare and progress of the nation. In private life, his genial temperament won for him the affection and esteem of a large circle of friends. Sir Charles Lemon was elected a member of the Society of Arts in 1852.

Notes.

HAVRE EXHIBITION.—The letter of Mr. Bernal, her Majesty's Consul at Havre, published in the *Journal*, February 28th, and drawing the attention of English manufacturers, merchants, and others to the importance of the exhibition to take place in that town in June, should not be disregarded. Many men of business complain that their interests are often overlooked in great universal exhibitions, such as those of London and Paris, and have expressed a desire to see something of a more thoroughly practical character attempted. The coming exhibition at Havre affords an admirable opportunity for testing the value of a purely commercial exhibition; the management is in excellent hands; the project is warmly supported by the Emperor and the Imperial government; and Havre is not only one of the very first import and export towns of France, but very convenient for English visitors. At a time when the rivalry between the manufacturers of the two countries in the export trade of the world is so animated, it would be a serious error if British products were ill represented. The programme of the exhibition includes all articles of export, and, consequently, it presents an immense field for English manufacturers and shippers. The agricultural exhibition of Rouen is appointed to take place at the end of May, and it is hoped that the Emperor will be present at the distribution of the prizes on the last day of that month, and afterwards visit the Havre exhibition, which is to open on the following day.

TECHNICAL EDUCATION IN FRANCE.—The Minister of Marine and of the Colonies has just issued an order relating to what are called the Schools of Maistrance, in which a certain number of workmen in the arsenals and dockyards, chosen by competition, receive such special theoretical instruction as fits them for foremen or heads of shops. These schools were reconstructed by decree in 1851, but the progress made since that time in industrial science and training having left these schools in arrear, the minister has caused an examination and report to be made upon them. The result is that a decree has been issued establishing preparatory Schools of Maistrance in each of the government yards and arsenals of Cherbourg, Brest, Lorient, Rochefort, and Toulon, and also a school at the imperial establishment of Indret, for the theoretical instruction of a certain number of workmen. In addition to these, two normal Schools of Maistrance are established, one at Brest, and the other at Toulon. All of these schools are placed under the charge of the department of the Director of Naval Construction. The old pépinière of the Luxembourg-gardens, which contained the finest collection of vines in France and a large number of other plants, has been swept away, to the great regret of professors and students in botany and arboriculture; but the chief gardener of the Luxembourg, M. Auguste Rivière, still continues his public instruction on the pruning of fruit trees; the lectures, which commenced on the 21st of last month, are given under a tent in the transformed garden on three mornings in the week.

EDUCATION IN HOLLAND.—Of secondary schools organized under the law of 2nd May, 1863, there were in 1865, 22, with 1,467 students, of whom five were educated at the expense of the state and 14 subsidized by their communes. These schools are established specially for the improvement of artisans and workmen. They serve at the same time as preparatory schools for the Ecole Polytechnique, founded at Delft on the 1st July, 1864. This college, which is intended to educate civil

engineers and others, architects, manufacturers, &c., numbered in 1865, 154 students.

Correspondence.

TECHNICAL EDUCATION.—SIR,—I am glad to see that a committee has been appointed to give practical effect to the recent Conference on Technical Education, and I hope that amongst the subjects to which the earliest attention of the committee will be directed will be the relations of the present system of apprenticeship to the development of technical education. I believe that the system of apprenticeship which now prevails in this country will be found to be the greatest, in fact, I may say the only, serious obstacle with which the promoters of technical education have to contend; at least, that is the result of my own experience in all the efforts with which I have been connected, both here and elsewhere, for promoting the study of the scientific principles of art, not only amongst the artisan, but also amongst the professional class of skilled craftsmen, such as engineers, architects, and the like. So long as the only recognised, and, indeed, possible, road to the acquisition of a practical art is through a five years' apprenticeship, during which, on the one hand, the master is neither compelled to teach his apprentice more than it is for his (the master's) interest that the apprentice should learn, nor to give him any opportunity of acquiring a knowledge of the scientific principles of his art in institutions in which alone such knowledge can be systematically taught; nor, on the other, is the apprentice compelled to show that he has made good use of his apprenticeship by the test of a practical examination in what he is supposed to have learned, so long will all attempts to put technical education on the same footing as that on which it is in on the Continent be abortive and futile. If we really want to place our skilled craftsmen of all classes in a position in which they can compete fairly with those of France and Germany, what we must do is to give them the same start in the race, and that start is in their apprenticeship. It is of very little use expecting to educate the adult artisan class of the present day as a whole; we must devote our attention mainly to the on-coming generations, and in 15 or 20 years we may, with good management, find ourselves on the same level as that on which France and Germany now stand. Now, sir, if we intend to educate the workman of the future in the principles of his art, we must do it whilst he is an apprentice; and if we want to do this we must, as a preliminary, revolutionise the system of apprenticeship now prevailing in this country, and assimilate it to that which obtains in France and Germany. We must abolish the condition of having merely passed so many years in a workshop, or a factory, or an office, as the test of proficiency in a craft, and we must substitute for it the test of examination. Moreover, we must make the passing of such an examination the *sine qua non* to the legal recognition of the apprentice as a master workman. In other words, we must put the practitioners of technical art on the same footing as that on which the practitioners of law and medicine now stand, and make the examination the primary, and the period of apprenticeship the secondary, condition of proficiency. If, in addition to doing this, we compel the master to allow his apprentice a reasonable amount of time to attend lectures, or to obtain information by other means in the theory of his art, and if we also give the apprentice, what I think it is only fair that we should give him, the right to shorten the duration of his apprenticeship by allowing him to go in for his examination as soon as he likes, I believe we shall have no difficulty in obtaining as comprehensive a system of technical education as we can desire. It is in this as in all other matters, provide the demand and the supply will soon appear. Establish demand for instruction in technical knowledge, and

you will soon find that you will have teachers and institutions start up in all directions to meet it. In spite of a good deal of outcry that has been made against it, I believe that the present system of the Department of Science and Art is quite elastic enough to meet all the demands that are likely to be made upon it for some time, and I do not see what more could have been done by it than it has done. To attempt to establish technical schools in different parts of the country so long as the present apprenticeship system exists, would be like establishing a hospital amongst a population which was notoriously healthy. The masters don't want them, and the apprentices don't care about them. The masters do not want them, because they are not sufficiently long-sighted to see their best interests, and because they do not care to travel out of their usual routine and give their apprentices time to attend the schools; the apprentices don't care about them, because they don't see how the knowledge which is to be acquired in them will materially assist their getting on in life, even if they had the time to attend them, which they have not. But once make the change in the relations of master and apprentice, and in the character of the apprenticeship, which I have suggested, and the whole aspect of the subject would be altered. Both masters and apprentices would quickly find out the advantages of technical schools, and the operation of the Government then, instead of being to weakly encourage their formation, would rather be to check their establishment by incompetent persons, or in conditions in which they could hardly expect to be successful. Depend upon it, this question of apprenticeship is the key to the problem against which we are all now so vigorously knocking our heads; and if the Committee want to do real service in the matter, they cannot do better than deal with it at once. Ten minutes and a sheet of foolscap would, I believe, be nearly enough to draw the outline of a bill which, if Parliament could be got to pass it, would make the future of technical education a very easy matter indeed.—I am, &c., FRANCIS T. BOND, M.D., Principal of the Hartley Institution, Southampton.

March 5, 1868.

MR. HYDE CLARKE'S PAPER.—SIR,—In your report of my remarks on Mr. Hyde Clarke's paper on "A Daily Mail to India," occurs a misprint, which you will oblige by correcting, since the extravagance of the statement invalidates everything else I say. The possible speed at which vessels might be propelled, if specially built for speed only, I named as 20 miles per hour; I am reported to have said 30 miles an hour, which never entered my mind. The necessary condensation in reporting excludes the context, which might make manifest a misprint.—I am, &c., JNO. JONES.

338, Strand, Feb. 28, 1868.

MR. HYDE CLARKE'S PAPER.—SIR,—I feel it my duty to protest against Capt. Donald Stewart's indiscriminating remarks with regard to the state and quantity of the rolling stock on Turkish railways, made at the meeting on the 26th ult. They may apply to one particular line; but, if so, he should have taken into consideration, for the sake of his own undertaking, if not for others, the critical position of all railways under Turkish guarantee, and should have signalled the exceptions. I beg to state that the Smyrna and Cassaba Railway, of which I have the honour to be chief engineer, is furnished with ample rolling stock for its traffic or for that likely to accrue during the next three years; and I send herewith a quotation from the *Impartial* of Smyrna, under the head of "Constantinople News," to show that the opinion of the public, as well as of the government, is in favour of that company. His Highness Fuad Pasha, and the members of the High Council of the Treasury, have stated to me their perfect satisfaction with the progress of the construction and the arrangements for traffic on this railway; and the Sultan himself informed a deputation from the board to Buckingham Palace, that he was so thoroughly con-

tented with the manner in which the construction and furnishing of the line was carried out by Mr. Edward Price, as well as with the management since the opening, that it would give him pleasure to favour any reasonable views of the company, and that an exceptional effort should always be made to satisfy promptly any claims it might make on the government. The real fact is, that no financial arrangement has been made by the government for the express purpose of satisfying the claims under the head "guarantee," which may be from time to time made by the several railway companies so privileged, and, consequently, when a payment is to be made on the score of guarantee, a special grant has to be made for the purpose, and extraordinary funds must be raised to meet it. In the meantime the company claiming payment is subject to the delay contingent on these proceedings.—I am, &c., CHARLES E. AUSTEN.

7, Broad Sanctuary, S.W., 28th February, 1868.

Quotation from the "*Impartial*" of Smyrna, just received, dated 8th February, 1868.

"Constantinople.—On nous écrit de Constantinople, le 5 Février:—'Tout accident est assurément regrettable; mais un malheur, quelques conséquences fâcheuses qu'il ait, s'il ne peut être réparé quand il coûte la vie de l'homme, trouve son atténuation dans les mesures qu'il provoque pour en prévenir le retour. C'est là le jugement porté par l'opinion publique au sujet du déraillement survenu sur le Chemin de Fer de Cassaba, et qui a occasionné la mort du mécanicien. En général, on a loué l'administration de cette voie de son empressement à s'enquérir de la cause de ce déraillement et de promettre une récompense pour découvrir l'auteur du méfait. Ces mesures démontrent, de la part de la compagnie, une sollicitude pour la vie des personnes et les intérêts du pays dont on ne saurait assez tenir compte. Elles sont aussi un moyen efficace pour attirer la confiance et assurer le succès de l'entreprise.'"

MEETINGS FOR THE ENSUING WEEK.

- MON.....Social Science Assoc., 8. Meeting of the Health Department. Dr. B. W. Richardson, "On the Effects of Excessive Physical and Mental Training."
R. Geographical, 8½. Mr. A. Waddington, "Geography and Mountain Passes of British Columbia, in connection with an Overland Route."
Medical, 5. Annual Meeting.
- TUES ...Royal Inst., 3. Mr. G. Scharf, "On Historical Portraiture."
Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion upon Mr. Sandberg's paper, "On the Manufacture and Wear of Rails."
Photographic, 8.
Ethnological, 8. 1. Mr. Crawford, "On the Migration of Plants yielding fermented Alcoholic and Oleaginous Materials." 2. Miss Haigh, "On the Island of Tenerife, and its Aboriginal Inhabitants, the Guanches." Communicated by Sir John Lubbock, Bart.
- WED ...Society of Arts, 8. Mr. Thomas Beggs, "On Courts of Arbitration, &c."
Geological, 8. Mr. Joseph Prestwich, "On the Structure of the Crag-beds of Norfolk and Suffolk, with some Observations on their Organic Remains."
Graphic, 8.
Microscopical, 8. 1. Dr. Collingwood, "On the Algae which causes the Coloration of the Sea." 2. Dr. Murie, "On a Method of arranging Microscopical Cabinets."
Literary Fund, 2. Annual Meeting.
Archæological Assoc., 8½.
- THUR ...Royal, 8½.
Antiquaries, 8½.
Zoological, 8½.
R. Society Club, 6.
Royal Inst., 3. Mr. G. Scharf, "On Historical Portraiture."
Society of Fine Arts, 8. Conversazione, at the Gallery of the Society of Female Artists, 9, Conduit-street.
- FRI.....Society of Arts, 8. Cantor Lectures. Dr. Crace Calvert, "On Chloride of Sodium, &c."
Astronomical, 8.
Royal Inst., 8. Mr. W. Stanley Jevons, "On the Probable Exhaustion of our Coal Mines."
R. United Service Inst., 3. Lieut.-Col. C. H. Owen, R.A., "Modern Artillery, as exhibited in Paris in 1867."
- SATRoyal Inst., 3. Professor Roscoe, "On the Non-Metallic Elements."
R. Botanic, 3½.

PARLIAMENTARY REPORTS. SESSIONAL PRINTED PAPERS.

Par. Numb. *Delivered on 20th February, 1868.*

29. Bill—Representation of the People (Scotland).
59. Court of Session (Scotland)—Return.
65. Charitable Funds—Return.

Delivered on 21st February, 1868.

27. Bill—Election Petitions and Corrupt Practices at Elections.
42. (c.) Postal Contracts.
57. Parliamentary Electors (Edinburgh)—Returns.
65. Electoral Statistics (Scotland)—Amended Return.
69. Sugar—Return.
71. The "Kit Carson" and "Bazaar"—Reports.
92. Metropolitan and City Police—Returns.
99. (1.) Metropolitan and City Police, &c.—Return.

Delivered on 25th February, 1868.

33. Bill—County Courts Admiralty Jurisdiction.
40. „ Sunday Trading.
35. Poor Law (Workhouse Inspection)—Return.
61. Suez and India Telegraph—Memorial.
68. Postage (Gibraltar, &c.)—Returns.
100. Nuneaton Railway Station—Reports.
102. Army and Marines (Flogging)—Return.

SESSION 1867.

558. Greenwich Hospital—Returns.

Delivered on 26th February, 1868.

32. Bill—Landed Property Improvement (Ireland).
37. „ Ecclesiastical Titles.
20. Record Publications—Return.
49. Mail Service (Bahamas)—Return.
92. Bank of England—Accounts.
93. Bank of England—Return.
103. East India (Irrigation)—Return.
107. Constabulary Fines and Fees Fund (Ireland)—Statement.
Public Petitions—Fourth Report.

SESSION 1867.

431. (A VIII.) Poor Rates and Pauperism—Return (A).

Delivered on 27th February, 1868.

43. Bill—London Coal and Wine Duties Continuance.
47. Army—Estimates (1868-9).
62. Army (Colonies)—Statement.
63. Army (Variation of Numbers, &c.)—Statement, &c.
78. Sardinian Loan—Account.
79. Greek Loan—Account.
80. Russian Dutch Loan—Account.
94. Mint—Account.
109. Railways—Report by the Board of Trade.
116. Revenue Department and Packet Service—Statement of Expenses.
General Post-office—Convention.

SESSION 1867.

46. (XII.) Trade and Navigation Accounts (31st December, 1867).

Delivered on 28th February, 1868.

60. Juries—Return.
76. Post office Mail Service (Havana and St. Thomas)—Contract.
97. National Gallery—Annual Report.

Patents.

From Commissioners of Patents' Journal, February 28.

GRANTS OF PROVISIONAL PROTECTION.

Acetic acid, &c., manufacturing—480—H. B. Condy.
Albums, &c.—500—J. P. Lack.
Aniline colours, compound of—496—H. A. Bonneville.
Bale ties—326—E. T. Maiuwarding.
Barometrical and thermometrical apparatus—529—L. Wollhelm.
Billiard marking boards, &c.—3029—G. Smith.
Blinds, &c., working the rollers of—453—J. Tansley.
Boilers—430—J. Howard and E. T. Bousfield.
Brush-making—490—F. Tolhausen.
Buckles, &c., substitute for—487—W. E. Deverna.
Candles—492—G. Roberts.
Carriage springs—454—H. A. Dobson.
Carriages—514—J. Barlow.
Cartridge boxes—478—S. B. Tucker.
Charcoal and sugar, treating—499—J. Steele and J. Hastie.
Cigar, ash, and light holder, combined—428—A. Philipp.
Coal, &c., excavating—458—J. W. Melling.
Corn, &c., drying machinery—466—J. S. Williamson.
Culinary purposes, revolving stands for—477—W. G. C. Hudson.
Cylindrical surfaces, connecting and disconnecting revolving—505—J. S. Raworth.
Dials for showing the distance travelled by public conveyances, and the fares due for the same—498—A. Lemasson.
Eggs, testing—464—F. Schäfer.
Envelopes—479—W. Wootton.
Fabrics, treating—520—J. P. Worrall.
Fibrous substances, spinning and twisting—518—W. H. Tasker.
Fire-arms, breech-loading—511—E. Cottam.

Fire-arms, &c., breech-loading—519—A. H. Brandon.
Fire-places—459—C. and L. Vezhulst.
Gas—465—A. Brin.
Gas meter cases—432—W. Cowan.
Gas stoves—485—R. George.
Glass, ornamenting—469—J. Wenden and S. P. B. Fussell.
Grain, cleaning—446—W. R. Lake.
Iron and steel—481—J. G. Willans.
Key rings, &c.—503—G. V. Wisedill.
Kneading apparatus—486—F. Grenier.
Knife cleaners—434—H. Woodward.
Lamp burners—522—W. Lincoln.
Lamps, moderator—497—H. A. Bonneville.
Lamps, safety—419—W. Hann.
Lamps, &c.—439—W. B. Marston.
Letter and invoice holders, &c.—445—W. Burgoyne.
Looms—470—S. C. Lister.
Looms—508—D. Whittaker.
Matches and fuses—455—T. J. Clanchy.
Millstones—475—R. Young.
Needles, papering—491—W. Woodfield.
Oils, treating and deodorising—506—R. Martin.
Ores, extracting and condensing the volatile portions of—493—W. R. Lake.
Paper, &c., cutting—476—R. C. Ross.
Pen and ink holders, combined—449—C. E. Brooman.
Pumps—484—W. G. H. Taunton.
Purses, &c., fastenings for—463—W. T. Woolley.
Puzzles and puzzle chains, &c.—523—J. G. Taylor.
Railway points and signals—509—W. Easterbrook.
Railway points, indicating position of—488—J. Wood.
Railway signals—447—P. Barnes and D. Hancock.
Railway wheel tyres, heating and forming metals for—3482—P. R. Lodge.
Railways and tramways—457—C. M. Holland.
Sewage, separating the solid and watery particles of—510—W. J. Bennett and J. Jobson.
Sheep, &c., shearing and clipping—451—H. C. Tucker.
Shipwreck, saving life in cases of—467—W. E. Newton.
Shirts—524—F. Chevassu.
Silk fancy weavings—463—G. Seamer.
Smoke, consuming—460—J. R. Stoney.
Stone, &c., crushing, &c.—512—B. Farmer.
Tiles, bricks, &c., ornamental—525—J. Walker.
Tobacco box and tobacco cutting machine combined—517—J. Clark and T. Vicars.
Trousers, &c.—338—E. Andrews.
Type composition, &c.—521—W. H. Wilkinson.
Valves—438—W. T. Sugg.
Water, raising—452—H. Schlotter.
Waters, manufacturing and storing aerated—353—A. Clark and A. van Winkle.
Whip holders—494—W. R. Lake.
Wood, preserving—441—N. C. Szerelmey.
Wood, treating compressed or embossed—371—J. H. Johnson.
Wool, &c., preparing for spinning—448—G. Jessop and B. Senior.
Woolen condensing machinery—461—W. Pickard.
Yarns, &c., sizing and balling—483—S. Seville.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Breasts, artificial—616—W. R. Lake.
Washing and rinsing machines—602—W. Krutzsch.
Wood, seasoning and preserving—553—W. R. Lake.

PATENTS SEALED.

2461. J. Douglas.	2493. P. F. Lunde.
2463. J. and G. W. Dyson and S. Martin.	2506. G. T. Bousfield.
2473. I. Dixon.	2513. H. Carter & G. H. Edwards.
2474. M. Hammerstein.	2541. J. Whitham.
2480. D. Nicoll.	2844. T. Nelson.
2489. A. Field and W. B. Nation.	2977. F. J. Bugg.
2492. A. E. Gelhaye.	2993. H. Ritchie.
	3190. W. and W. Campion.

From Commissioners of Patents' Journal, March 3.

PATENTS SEALED.

2503. F. B. Döring.	2539. B. F. Stevens.
2509. R. A. Jones & J. C. Hedges.	2549. F. Tolhausen.
2514. G. Cope.	2554. J. Turnock.
2515. J. Ford.	2555. J. Medhurst.
2521. H. Gardner.	2593. W. F. Batho.
2526. W. G. Creamer.	2604. J. Jeyes.
2527. T. W. Hollwell.	3002. L. Stockman.
2534. J. B. Rogers.	197. W. R. Lake.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

441. W. Kirrage.	550. T. W. Roys and G. A. Lil-
556. S. S. Gray.	liendahl.
610. L. C. Cottam.	592. R. Johnson.
441. W. Kirrage.	577. J. Dodd.
558. G. Launder.	579. A. T. Godfrey.
483. L. A. Bigelow.	708. F. A. Braendlin.
542. C. Whitting.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

506. J. Taylor, jun.	526. G. Smith and J. Carrick.
513. W. J. Hay.	309. J. Silvester.
483. L. A. Bigelow.	